

demonstrate how these living agents can be used directly, either as they occur naturally, or following genetic modification. Alternatively, the techniques of molecular biology can be used to generate microbial toxins *in situ* in a species to be protected and viruses can be engineered to express genes that encode toxins or enzymes detrimental to the species infected.

The direct use of micro-organisms is expanded in Ch. 12, 'Micro-organisms for Plant Disease Control' and Ch. 13, 'Microbial Herbicides—Factors in Development'. These agents have an optimistic future as part of programmes of integrated pest/crop management but progress toward practical use has been slow so far and the difficulties attending commercialisation for small, specialised markets, where there is still strong competition from synthetic chemicals, are considered in these chapters.

Not all naturally produced chemicals are safe, as is evident from Ch. 5 and Ch. 9, and many would be treated as conventional pesticides for regulatory purposes. Others are regarded as 'biochemical pest control agents' (e.g. pheromones, natural insect and plant growth regulators and enzymes), as distinct from the microbial pest control agents surveyed in Chs 10–13. The prospects for the latter, as natural, specific, short-lived and therefore environmentally more acceptable control agents are overshadowed by public concerns, real or not, about unforeseen effects of their release into the environment, particularly if genetic manipulation is involved. Clearly, it will take time and experience to alleviate these concerns. The final chapter (14) on 'The Registration of New Natural Products', summarises the regulatory requirements specified by the US EPA for naturally produced chemicals, their synthetic analogues and the biopesticides discussed in the latter part of the book. This review demonstrates the complexity of the subject and the burdensome nature of the regulatory requirements, but, on the other hand, shows the care that is taken in regard to the use of these materials in practice.

The range of organisms considered and the diversity of the chemicals they produce, some with more than one type of biological activity, make the organisation of such a text no easy task. Rapid access by the reader is aided, however, by division of the chapters, all written by international experts in their fields, into sub-sections which are fully listed in the Contents section.

The long-standing interest in this area is stimulated by the advent of rapid screening techniques as the search for leads to environmentally acceptable agrochemicals intensifies. With more than 2100 references and illustrations of some 500 chemical structures, the book merits a place in libraries and should be a valuable information source for research workers as well as others with a general interest in natural products.

G. T. Brooks

**The neem tree: source of unique natural products for integrated pest management, medicine, industry and other purposes**, ed. H. Schmutterer, VCH Weinheim, Germany, 1995, 716 pp., price DM198.00. ISBN 3-527-30054-6

Heinrich Schmutterer is recognised internationally for his work with the neem tree and its beneficial biological effects. This is a comprehensive review, put together by the world's leading authorities, on the biology and nomenclature of the tree, the biologically active secondary metabolites that it contains and the activity of these components against a range of living organisms from viruses and bacteria, through insects and mites to vertebrates. It is followed by discussions on the practical results that have been achieved with neem extracts in the field with particular reference to integrated pest management, activity against arthropods and the risk of resistance developing. A short chapter on the toxic effects of neem against vertebrates and non-target organisms probably reflects the lack of data rather than the lack of effect. That there may be other long-term toxic effects was suggested by the chapter that deals with the use of neem and neem extracts as medicines in folklore. I know that I am an unbeliever when it comes to alternative medicine but how is it possible that a compound used as an agent for abortion or as an oral contraceptive can have no deleterious effects in its use in crop protection? Maybe it is insufficiently stable to remain as the active component on the crop but if this is the case will it not also have to be applied frequently to give long-term protection? I was disappointed to find a chapter on the socioeconomic and political considerations of neem use because these chapters always denigrate chemical crop protection and advocate grinding up plants and using them, with no control on dose or product quality, for frequent application to food crops, livestock and residences to control insect pests. This chapter is no exception and although it is often cost-effective to grow your own insecticides, the wanton and uncontrolled use of compounds with such broad biological activity and subject to contamination by mycotoxin-producing fungi should be accompanied by warnings of potential problems. The book closes with a chapter on other Meliaceae plants that possess secondary metabolites with biological activity.

But this review should not be a criticism or a commendation of the product, it must be a review of the book. As such the book is a full and extremely well referenced examination of the plant and its close relatives. It describes the chemistry of the compounds and gives detail of the biological effects. Unfortunately, in most cases there is no reference chemical compound included in the bioassays so it is not possible to be certain of the relevance or reliability of the assay and it is, therefore, difficult to be sure that the effect of the neem compounds is a useful effect. This is particularly true of

laboratory-based tests but again it is a criticism of the published data not the book. It was good to see an attempt to examine effects on a wide range of pest and disease problems even if the effect was not strong or convincing. The main part of the biological activity section (205 pages) is a review of mites and insects and the effects of neem and neem extracts or products on them. This to me was worth the price of the book alone and, once again, the comprehensive references ensured that any type of activity could be followed up.

I often argue that the fight against phytophagous and disease-carrying insects is such an important one that we should use all the weapons available to us to ensure success. It is important that we respect the advances made by others in the field and work together to improve our successes. It is of no help to anyone to argue a case by denegrating the achievements of others. Unfortunately, all too often in this book the statement occurs that the use of toxic and environmentally damaging synthetic chemicals is a practice that has to be stopped. Why not say that the integration of careful chemical usage and natural systems will give us the answers we are seeking? Surely this is integrated crop management. But if you can overlook these things and you want to know all that there is to know about the neem tree—buy this book.

**L. G. Copping**

**Biotransformations, Volume 7: A survey of the biotransformations of drugs and chemicals in animals**, ed. D. R. Hawkins, The Royal Society of Chemistry, Cambridge, 1996, xxxii + 486 pp., price UK £139.50. ISBN 0-85404-403-5

This latest volume in the 'Biotransformations' series contains material on the metabolism of chemicals in vertebrates (or in-vitro tissue preparations therefrom) selected from publications appearing in 1993–1994. Cumulative compound, key functional group and reaction type indexes are provided, to facilitate access to all

of the information in volumes 1 to 7. The book is organised so that the information can be presented on CD-ROM as 'Metabolism Database' (Synopsis Scientific Systems Ltd, 1997).

The overall aim of the series is to provide an easy method for accessing information on the known pathways for the biotransformation of structurally related compounds, including pharmaceuticals, agrochemicals, food additives, environmental and industrial chemicals.

The chemical structures of key functional groups and entire molecular types are listed at the beginning of the book (pp. ix–xxxii). Following this listing is an overview chapter on highlights from the body of the volume, e.g. novel biotransformations, stereoselective processes, and mechanisms of toxicity in relation to specific biotransformations. The remainder of the volume is then divided into sections based on chemical structure type, viz. aromatic hydrocarbons; alkenes and alkanes and their halogen-substituted derivatives; acyclic functional compounds; substituted aromatic compounds; miscellaneous alicyclics, aromatics and macrocycles; heterocycles; functional nitrogen compounds; nitrosamines; amino-acids and peptides; steroids; miscellaneous compounds.

Within each of these main sections, a one- to two-page abstract gives, for each chosen chemical, basic information including key functional group classification, test system and analytical methods used and an illustration of the metabolic pathway(s) observed, with one or more key literature sources of the information.

Volume 7 contains entries for some 250 chemicals of which about 10% are agrochemicals. The book is well presented and interesting in itself but will probably be of greatest value to those interested in metabolic pathways in general, who already have volumes 1–6 and may be thinking of setting up the CD-ROM, which will cross-refer to these volumes. Continuing with volume 7, the stated aim of the series is being well achieved in offering rapid access to recent metabolism studies.

**G. T. Brooks**